

# PROTEINS

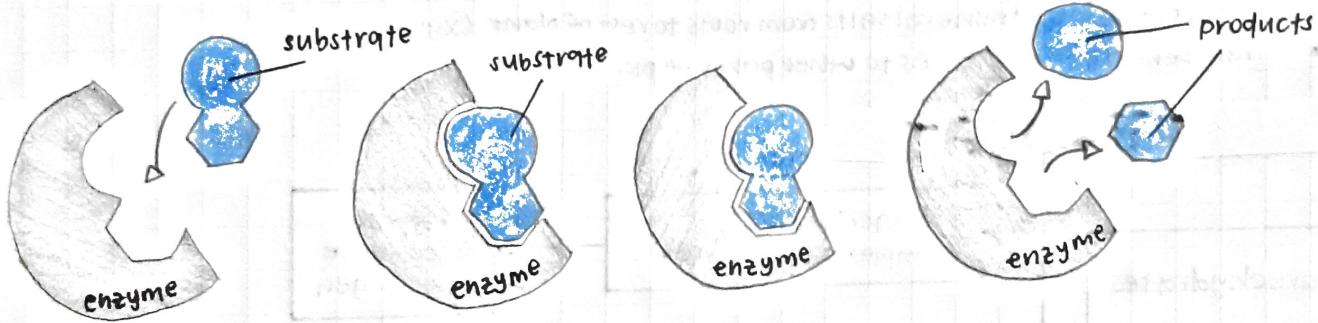
- made up of amino acids
- form polypeptide chains
- biuret test  
→ violet colour

# ENZYMES

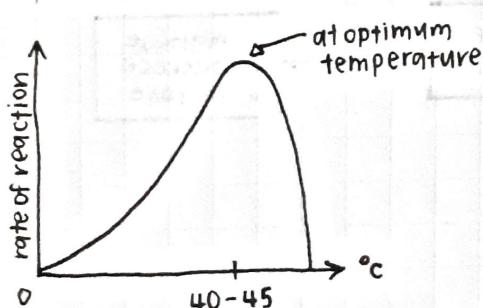
- enzymes are biological catalysts that can alter/speed up the rate of chemical reactions without being altered in the reaction.

## lock-and-key hypothesis

- the enzyme has a specific active site
- the substrate has a 3D-shape complementary to the active site so it can fit and bind to the active site of the enzyme, forming an enzyme-substrate complex
- the reaction converts the substrate into product molecules which detach itself from the active site.
- the enzyme remains unchanged.

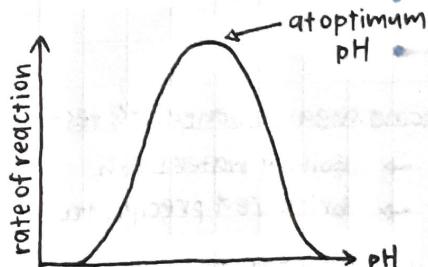


## effects of temperature



- enzymes are inactive at low temperatures as there is little kinetic energy so frequency of collisions is low
- rate of enzyme activity increases with increase of temperature as substrate molecules are able to collide with enzyme active sites more
- enzyme activity is highest at optimum temperature
- when temperature rises above optimum level, the active site loses its shape and the substrate can no longer fit into the active site (denatured)
- at extremely high temperatures, the enzyme is completely denatured and rate of reaction = 0.

## effects of pH



- enzyme activity is highest at optimum pH of the enzyme
- as pH increases or decreases from the optimum, enzyme activity sharply decreases
- extreme changes in pH denatures the enzymes and rate of reaction = 0
- optimum pH for each enzyme differs (pepsin in stomach → acidic trypsin in intestines → alkaline amylase → neutral)